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Forest  
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Subject: Evaluation of Bark Beetle Effects on Vegetation in Stumpy  
Meadows Campground, Georgetown District, Eldorado NF (C95-10)

To: District Ranger, Georgetown District, Eldorado NF

In August, 1995, evidence of bark beetle attack was observed on two large (>50 inch DBH) ponderosa pines in Stumpy Meadows Campground on the Georgetown District, Eldorado NF. District personnel requested a Forest Pest Management (FPM) evaluation which was subsequently conducted on November 21, 1995 by John Wenz, Entomologist with the FPM South Sierra Shared Service Area. The purpose of the evaluation was to (1), assess bark beetle and associated insect/pathogen conditions and effects on vegetation and (2), discuss management options.

#### Observations

##### Vegetation

Stumpy Meadows Campground is a 40-site facility located on the north side of Stumpy Meadows Lake at about 4000 ft. elevation. The vegetation is a mixed conifer, multi-storied, stand. The overstory consists of pre-dominants, primarily ponderosa pine and a few, scattered, incense-cedar, dominants, including ponderosa pine, white fir and incense-cedar, and co-dominants composed of white fir, incense-cedar and black oak. Overstory trees ranged to 140-150 feet in height with diameters of 27 to 67 inches. The intermediate layer and understory consisted of incense-cedar, white fir, Douglas-fir and black oak. Regeneration was primarily white fir and incense-cedar often in dense clumps. Basal areas were variable and ranged up to 300+ sq.ft. per acre. The shrub/herbaceous vegetation was dominated by bear clover and manzanita.

##### Insects and Pathogens

Results of the evaluation in terms of bark and engraver beetle activity are summarized in Table 1 and Figure 1. The eight ponderosa pine were attacked by the red turpentine beetle (RTB), Dendroctonus valens (see RTB biology, Appendix 1). With one exception, none of the pines attacked by RTB showed external evidence of attack by other bark beetles like the western pine beetle (D. brevicornis) or the mountain pine beetle (D. ponderosae). The exception, Tree #1 located near Campsite #2, was attacked by the mountain pine beetle in addition to RTB and will not survive. Trees # 2 and 3 had relatively few attacks over limited areas of the boles. Attacks on Tree #4 were restricted to the east side of the bole and appeared unsuccessful. The remaining four pines (#3, #5, #10, and #11) had extensive RTB attacks over most of the bole circumference extending at least 10 ft. to 15 ft. up the bole with coarse reddish boring dust embedded in the pitch tubes and accumulating in the bark crevices below the attacks. The bark was not removed to evaluate attack



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success (i.e., extent of gallery development, egg deposition or larval survival etc.) to minimize injury/damage to the trees. Except for Trees #1 and #2, the attacked pines had relatively full, 35% to 60% live, crowns that did not exhibit poor needle retention or fade sometimes indicative of root disease.

The three dead white fir (Trees #'s 6-8 located near Campsite #9) had been attacked by the fir engraver, Scolytus ventralis, and the roundheaded fir borer, Tetropium abietis (Coleoptera: Cerambycidae). Very little white fir top-kill or branch mortality in the upper crown, typical of fir engraver activity, was observed in the campground.

Incense-cedar scale, Xylococcus macrocarpa (Homoptera: Margarodidae), was present on incense-cedar throughout the campground. This scale commonly occurs under the loose bark of incense-cedar and can produce large quantities of honeydew. The honeydew is often colonized by sooty mold which, when populations are high, results in blackened boles and/or limbs. The scale tends to be most common on small diameter cedars (< 6 inches DBH) and on the thinner-barked areas of larger cedars. The incense-cedar scale has reportedly caused mortality to young cedars growing in dense pockets of regeneration, but has not been associated with economically important mortality. In addition, a few, individual, incense-cedar rust (Gymnosporangium libocedri) "witches-brooms", were observed on a few cedars in widely separated locations. This rust fungus does not cause tree mortality and is not currently a management concern.

True (leafy) mistletoe, Phoradendron villosum ssp. villosum (see True Mistletoe biology, Appendix 1), was present on many of the black oaks in the campground, particularly in eastern part of the loop. Infection levels were variable but appeared light to moderate in most affected oaks. The black oaks appeared generally healthy with relatively little branch dieback and/or decay. Dwarf mistletoe infections were very low in the campground. Western dwarf mistletoe, Arceuthobium campylopodum, was present in lower crown of a single ponderosa pine on the outside perimeter of Campsite #32.

#### Discussion

Stumpy Meadows campground is situated on an excellent growing site. For the most part, the mixed conifer/hardwood vegetation within the campground is currently in good condition from the standpoint of mortality and top-kill. Following are some insect and disease management options to consider for integration into the overall management of the campground.

Red Turpentine Beetle. With the possible exception of Monterey pine, RTB attacks on healthy trees are usually limited in extent and restricted to the lower 12 inches to 18 inches of the bole and do not result in tree death. Repeated, extensive, attacks that occur several feet up the bole and that are sometimes associated with tree mortality, occur most commonly on trees that have been physically wounded, injured by fire, weakened by black stain root disease, stressed by drought, and/or attacked by other bark beetles such as the western or mountain pine beetle. None of these factors were consistently present on either RTB attacked, or un-attacked, pines in the campground. The apparently healthy condition of the RTB attacked trees (except Tree's #1 and #2) and uncertainty as to success of the RTB attacks, indicate that these trees may survive the 1995 attacks.

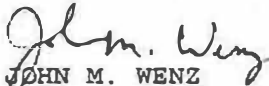




Given the importance/value of the vegetation in the campground, particularly the overstory pines, the following monitoring and survey actions are suggested for 1996: (1) Closely monitor the infested trees for evidence of crown fade, an indicator that the 1995 RTB attacks were successful and killed the tree. Monitoring should be conducted anytime after about April 1, 1996, depending on weather. A warm spring would suggest an early evaluation from both a tree physiology and beetle activity standpoint. (2) Survey the entire campground for new, 1996, RTB attacks. Timing of the survey is similar to that for monitoring the currently attacked trees. If some of the current attacks are in fact successful, the infested portion of the bole can be checked for adult emergence holes to help time the survey. Adult emergence holes are round and do not have any pitch associated with them. Red turpentine beetle attacks have been reported from other campgrounds in 1995 (Bob Rogers, Sequoia NF, pers. com.) and it is suggested that multiple (2-4) surveys be conducted in the spring/summer of 1996 to account for an extended adult flight period. If some of the 1995 attacked trees die and new attacks are found in 1996, RTB management alternatives, including the use of insecticides to prevent attacks on uninfested individual trees, should be considered.

True Mistletoe. True mistletoes can be a problem where individual trees are of importance. Heavily infected trees are weakened, suffer reduced growth rates, and may be predisposed to attack by bark beetles (in the case of black oak, scolytids in the genus Pseudopityophthorus). Heavily infected branches are more prone to breaking off during wind storms, becoming potential hazards and creating entrance points for decay fungi. Infection levels in the campground will increase through time, particularly in already infected oaks, via bird feeding activity. The District might consider a more complete oak-true mistletoe survey in the campground to better assess the need for implementing management action.

Vegetation Management. Over time, despite the high site quality that can sustain relatively high stocking densities, bark beetle-related mortality can be expected to occur. Individual, large-diameter, overstory pine will be periodically attacked by western or mountain pine beetles. This, coupled with the lack of pine regeneration, will contribute to the successional trend toward a stand dominated by white fir and incense-cedar with lesser amounts of Douglas-fir and black oak. As this trend toward relatively dense plant aggregations with an increasing proportion of white fir continues, increased mortality, top-kill and branch dieback due to fir engraver activity can be anticipated. Reducing between-tree competition by thinning/ sanitation treatment, primarily in the advanced regeneration and understory layers should promote a more vigorous future stand and prevent/reduce undesirable bark and engraver beetle effects on the campground vegetation. It is suggested that the District develop a vegetation management plan for Stumpy Meadows Campground that includes insect and pathogen considerations.

  
JOHN M. WENZ  
Entomologist

Enclosures



Table 1. Description of bark and engraver beetle attacked trees, Stumpy Meadows Campground, Georgetown District, Eldorado NF, November 21, 1995.

Tree No.	Species	DBH (inches)	Live Crown % <u>1</u> /	Observations
1	PP <u>2</u> /	9.9	<1	RTB <u>4</u> / lower 3.5 ft. of bole, larvae present: MPB <u>5</u> / lower 1/3 of bole, parent adults and larvae present; blue stain; dead
2	PP	14.3	15	1-2 unsuccessful RTB attacks
3	PP	27.0	35	Extensive RTB attacks to 10 ft.; fewer RTB attacks 10-15 ft; may be 1994/95 attacks
4	PP	21.0	50	Limited RTB attacks east side of bole to 5 1/2 ft.; may be unsuccessful
5	PP	56.4	60	Moderate RTB attacks to 15 ft.; coarse reddish boring dust
6	WF <u>3</u> /	9.7	NA	Dead; fir engraver/roundheaded borer
7	WF	12.3	NA	Dead; fir engraver/roundheaded borer
8	WF	<4.0	NA	Dead; fir engraver/roundheaded borer
9	PP	28.9	40	Four RTB attacks associated with hatchet wound at 2 1/2 ft.
10	PP	50.6	50	Extensive RTB attacks to 15ft; scattered attacks above 15 ft.
11	PP	13.5	45	Extensive RTB attacks to 7 ft.; scattered attacks to 12 ft.

1/ % = Percent of total tree height with live crown

2/ PP = Ponderosa pine

3/ WF = White fir

4/ RTB = Red turpentine beetle

5/ MPB = Mountain pine beetle

## Appendix 1. Pest Biologies.

### **RED TURPENTINE BEETLE** *Dendroctonus valens*

(Coleoptera: Scolytidae)

The red turpentine beetle (RTB) occurs throughout the pine forests in the United States (except in the southeast) and attacks all species of pine within its range. The RTB usually attacks injured, weakened or dying trees and freshly cut stumps. Ponderosa pines infected with black stain root disease are particularly susceptible to attack by RTB and evidence of RTB attack may be an indicator of the presence of root disease. Pines scorched by wildfire or prescribed burns are also susceptible to RTB attack. Trees attacked by RTB do not necessarily die but may be predisposed to attack by more aggressive bark beetles like the western and mountain pine beetles.

The RTB generally completes one generation per year. In the southern part of its range there may be a partial second generation and in the northern areas, it may take more than one year to complete a generation. Adult flight usually occurs between May and October although in the warmer parts of its range it can fly at any time. Attacks usually occur in the basal section of bole within 6 to 12 inches of the ground, often at the soil line or root crown. They are characterized by large reddish pitch tubes near the point of entry and generally found on only part of the bole circumference. On severely stressed trees or during periods of drought, attacks may extend underground on the main roots to 15 feet from the bole, extend up the bole to a height of 12 feet or more, and often affect almost the entire bole circumference.

The adults range in size from 5.3 to 8.3 mm and are generally considered to be the largest of the western bark beetles. If an attack is successful, the adults excavate an irregular, often cave-like, gallery in the cambium. The female lays eggs along the sides of the gallery in groups of 10 to 40 that are loosely packed with grass. The larvae feed in a mass (rather than in individual, discrete, larval galleries) and can destroy large areas of cambium. Both larvae and adults overwinter.

TRUE MISTLETOE  
Phoradendron sp.

True, or leafy, mistletoes are parasitic plants in the genus Phoradendron with mature shoots more than six inches long. The size of their shoots help to distinguish them from dwarf mistletoes. The foliage of true mistletoes may be leafy or scaly, and their fruit is a round berry. They are mainly parasites of hardwoods but also infect several species of conifers in California, and obtain water and minerals from their host.

This pest is spread mainly by birds, including robins, bluebirds, thrushes, and cedar waxwings. Birds feed on the berries, digest their pulp, and excrete the living seed, often depositing them onto susceptible trees. A viscous coating and hair-like threads on the outer surface of the seeds attach them firmly to twigs and branches, where they germinate and infect host tissues.

Young or small trees are seldom infected by true mistletoe. In nearly all cases, initial infection occurs on the branches of larger or older trees because birds prefer to perch in their tops. Severe buildup of mistletoe often occurs in an already-infected tree because birds are attracted to and may spend prolonged periods feeding on the mistletoe berries.

True mistletoes are often considered to be curiosities, but they can be serious pests where individual trees are of high value, as in yards, parks, and campgrounds. Heavily infected trees are weakened, reduced in growth rate, and sometimes killed. Weakened trees are predisposed to attacks by insects and often die during drought or other periods of stress. Branches and tree tops heavily-laden with true mistletoe often break during wind storms, increasing the hazard to people and property in campgrounds and other developed sites.

Figure 1. Locations of red turpentine beetle infested pines and fir engraver killed white fir, Stumpy Meadows Campground, November 21, 1995.

